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ABSTRACT

This paper concerns a national evaluation study of the upward Bound (UB) Program conducted for the U.S. Office of Education by the Research Triangle Institute. It presents the major results of the study with attention to methodological considerations of analysis. Two sets of analyses are discussed: (1) a set designed to examine the effectiveness of the UB program nationally, and (2) a set designed to examine differential UB project effectiveness. The national impact findings are quite consistent in support of the central theme that for student outcomes relating to postsecondary school entry, there are strong positive relationships with UB participation; but for outcomes related to high school academic success or continuation no consistent relationships to UB participation exist. These findings suggest that the impact of the UB program on student participants is primarily in the area of facilitating entry into education beyond high school. Given a national program impact, findings related to differential project effectiveness do not reveal any systematic program treatments that are related to differential project success. Rather, the relative success of individual projects seems more related to the characteristics of students recruited than to functional or structural characteristics of the projects. (Author)

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A National Study of the Upward Bound Program: Analysis, Major Findings, and Implications

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ABSTRACT

A National Study of the Upward Bound Program:
Analysis, Major Findings, and Implications[1/]

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This paper is the fourth in a series of four papers concerning a national evaluation study of the Upward Bound (UB) Program conducted for the U.S. Office of Education by the Research Triangle Institute.[2/] It presents the major results of the study with attention to methodological considerations of analysis. Two sets of analyses are discussed: (1) a set designed to examine the effectiveness of the UB program nationally, and (2) a set designed to examine differential UB project effectiveness.

The national impact findings are quite consistent in support of the central theme that for student outcomes relating to postsecondary school entry, there are strong positive relationships with UB participation; but for outcomes related to high school academic success or continuation no consistent relationships to UB participation exist. These findings suggest that the impact of the UB program on student participants is primarily in the area of facilitating entry into education beyond high school.

Given a national program impact, findings related to differential project effectiveness do not reveal any systematic program treatments that are related to differential project success. Rather, the relative success of individual projects seems more related to the characteristics of students recruited than to functional or structural characteristics of the projects.

1/ Paper presented at the 1976 Annual Meeting of the American Educational Research Association, San Francisco, California, 23 April 1976.

2/ Burkheimer, G. J., Levinsohn, J. R., Koo, H. P., and French, A. M. Evaluation Study of the Upward Bound Program (Volume IV of A Study of the National Upward Bound and Talent Search Programs. Four Volumes). Research Triangle Park, N.C.: Center for Educational Research and Evaluation, Research Triangle Institute, April 1976.

A National Study of the Upward Bound Program: Analysis, Major Findings, and Implications

INTRODUCTION

This paper is the fourth in a series of four papers[1/] concerning a national evaluation study of the Upward Bound (UB) Program conducted for the U.S. Office of Education by the Research Triangle Institute. Addressed in this paper are the major study results with attention to methodological considerations of analysis.

A considerable analysis effort was undertaken in the (UB) evaluation study, and only the highlights of those analyses will be addressed in this paper. For the interested reader, a more complete report of analysis results may be obtained from the project final report.[2/] Results reported in this paper represent two logically distinct sets of analyses, one set conducted in a classical hypothesis testing mode, the other set in a hypothesis generating mode.

The first set of analyses discussed in this paper relates to an evaluation of the national impact of the UB program on its participants—the major purpose of the study as originally conceived--using the student as the unit of analysis. Of specific concern were student outcomes related to three major objectives of the UB program:

1) Increasing the high school (HS) retention rates of participants.
2) Increasing, among participants, the rate of entry into postsecondary education (PSE).

1/ The other three papers (AERA Discussion No. D.19, 1976 Annual AERA meeting, April 19-23, 1976, San Francisco, California) are:

Pyecha, J. N. and Berls, R. Background, Objectives, and Design of the National Study of the Upward Bound Program.

Bergsten, J. Sample Design and Data Collection Procedures: National Study of the Upward Bound Program.

Koo, H. P. and Burkheimer, G. J. A National Study of the Upward Bound Program: Methodological and Design Considerations.

2/ Burkheimer, G. J., Levinsohn, J. R., Koo, H. P., and French, A. M. Evaluation Study of the Upward Bound Program (Volume IV of A Study of the National Upward Bound and Talent Search Programs. Four Volumes). Research Triangle Park, N.C.: Center for Educational Research and Evaluation, Research Triangle Institute, April 1976.

3) Generating the skills and motivation necessary for success in education beyond high school.

These analyses speak directly to the "worth" of the national UB program, examining outcome measures for UB participants relative to analogous measures for comparison student (CS) nonparticipants. Such comparisons can validly address UB impact when control of other relevant factors has been accomplished (by design or statistical adjustment).

The second set of analyses examines whether certain structural and functional characteristics of UB projects are differentially related to student outcomes. For this set, the analysis unit is the UB project, and the project variation considered in these analyses is relative variability (i.e., one is assessing whether particular project characteristics are associated with more or less successful outcomes relative to other projects). Again, the comparisons are valid if control for other relevant factors has been accomplished.

Certain design and sampling considerations have been discussed in previous papers in this series and will not be addressed here. Other pre-analysis considerations are central to analysis and some limited coverage of these matters will be presented. Space limitations will require, however, a very abbreviated presentation, and the interested reader is again referred to the final project report for more detailed treatment.

PRE-ANALYSIS CONSIDERATIONS

Care was taken throughout the study to avoid analyses which would introduce favorable or unfavorable bias toward the UB program. Considerable effort was made to insure that the data entering analysis were consistent and error free. The sample was designed to reduce many of the possible differences which could exist between the UB and CS groups (and which could, therefore, lead to spurious group differences), and statistical equalization of the two groups was undertaken in an attempt to reduce confounding of results by possible pre-process and extra-process differences which were not controlled by sampling. Weight adjustments for instrument and item nonresponse (or indeterminate response) were employed in critical

analyses in an effort to avoid distortion of the findings due to incomplete data collection. Therefore, prior to major analytic efforts, considerable attention was directed toward the utility and feasibility of alternative analysis strategies and techniques, and an extensive examination of the raw responses, as well as derived analysis variables, was undertaken to investigate the quality of the available data. Since these matters reflect directly on a meaningful interpretation of results of the major analyses, they will be briefly considered.

Return Rates

Return rates for various instruments, which have been presented in a previous paper in this series, have two obvious implications for analysis, both of which are related to the extent to which data collected represents the potentially available data given complete return. If nonrespondents mirror respondents in all relevant characteristics (an assumption that is commonly made but rarely justified), then response rate presents no problem for analysis. More likely, however, respondents differ from nonrespondents. The greater the return rate, the less the nonrespondent group can influence the results obtained, regardless of how different they might be from respondents. Both possible sources of nonrepresentativeness in collected data were addressed: (1) individual response rate, and (2) the clustering of nonrespondents (i.e., the distribution of nonresponse over logical units of possible respondents—in this case UB projects). Return rates for major student instruments were considered generally satisfactory[3/] and showed no serious difference over projects. More importantly for analyses involving differences between UB and CS groups, return rates did not differ within these two groups. Given the more reasonable assumption that any bias, introduced as a result of nonresponse is similar for UB and CS groups, then comparisons of the two groups should not reflect that bias.

3/ Overall student response rate (return of one or more questionnaire) was quite high, 99.8 percent for the UB group and 98.3 percent for the CS group, reflecting extensive data collection efforts in the fall 1974 to reach all previous nonrespondents. Telephone follow-up during the fall 1974 data collection period raised the fall 1974 data return rates to 80.2 percent and 78.1 percent for the UB and CS groups, respectively.

Return rates and differential project response were considered less satisfactory for the staff instruments, particularly in light of the importance of the study to these staff members. Nevertheless, project staff questionnaire responses were within acceptable levels.

Data Quality

While response rates to the instruments define the upper limit of data availability, high and nondifferential return rates do not in themselves assure data integrity. Item nonresponse, careless response, and deliberately misleading response can greatly degrade data quality even if 100 percent return of questionnaires were realized. Such sources of response error are usually reflected as missing data, out of range data, multiple responses, or inconsistent data. In attempts to rectify some of these problems, techniques of imputation were often employed.

Examinations of indeterminate data suggested that the incidence of multiple and out of range responses was very low, accounting for no more than 0.2 percent of the data, on the average, for any given questionnaire item. The relative frequency of imputed responses was, on the average, even lower. The incidence of item nonresponse was considerably greater; however, this problem seemed to be concentrated within a few items and individuals. In all, the extent of unavailable data had no serious impact on analysis.

The extent of logically inconsistent responses within specific questionnaires was, in some cases, considerably greater than would be desired. Proportionately large numbers of inconsistent responses were, however, traced to items which appeared on reexamination to be somewhat ambigious. Nonetheless, incidence of inconsistency still remained at upwards of five percent for some relatively unambigious items. Inconsistency of responses between instruments (in most cases reflecting response differences from two different reporting sources) was also observed. In light of the basically objective nature of the responses compared, such observed inconsistencies were relatively large. Although inconsistent data were not used in analysis, the real danger of high rates of observed inconsistency lies not in the items for which the inconsistency is observed but with those items which were not amenable to consistency checks. A high rate of observed inconsis-

tency is symptomatic of one or more factors which could be influencing some or all of the remaining data items (e.g., ambiguity of question wording, inattention or carelessness on the part of the respondent, or deliberate attempts to provide false data on the part of the respondent). The consistency checks performed signal the strong possibility of existence of one or more of these factors, which reduces the reliability, and thus the validity, of the data.

Weight Adjustments for Nonresponse

To provide unbiased estimates of population parameters, sampling weights (the inverse of the probability of selecting the student or project) were used in the analyses. The use of sampling weights overcomes possible bias in resulting statistical estimates which may be introduced because students or projects were selected with unequal probability (due to oversampling of specific groups).

In cases of nonresponse or other forms of indeterminate data, weight adjustments were made. Such adjustments involve apportioning the sampling weights of nonrespondents proportionally among the respondents who are in a category most like them (e.g., in the case of students, to those other students from the same project or school, and of the same sex, race, academic risk status, poverty status, and grade level). The adjustment technique may be expressed succinctly as follows:

$$w'_{ij} = w_{ij}\left\{1 + \frac{\sum_{j\epsilon NR} w_{ij}}{\sum_{j\epsilon R} w_{ij}}\right\}, \text{ for respondent and}$$

$$w'_{ij} = 0, \text{ for nonrespondents,}$$

where w'_{ij} is the adjusted weight for unit j in category i, w_{ij} is the raw sampling weight for that individual, NR is the set of nonrespondents in category i, and R is the set of respondents in category i. In terms of estimates obtained, this technique yields results that are equivalent to those from a technique of assigning an imputed value of the category mean to each nonrespondent. In terms of standard error computation, however, the two techniques do not yield equivalent results.

Adjustments for Group Differences

In order to provide more meaningful analyses of student outcomes, a balancing procedure was used to statistically equalize the UB and CS group with respect to certain pre-process and extra-process variables. In cases such as this, where moderator variables (pre-process variables) are related to dependent variables (student outcomes) and where the distributions of these moderator variables are different for the groups under consideration (UB and CS), it is usually sound analytic practice to adjust or correct the dependent variables for the influence of such moderator variables. The balancing procedure, which has been described in the third paper in this series, forced an equivalence of the UB and CS groups on the distribution characteristics which are related to outcomes but which were not completely controlled by the study design (i.e., sex, race, academic risk status, poverty level status, and grade in HS), thus bringing about greater comparability of the two groups.

Other Uncontrolled Sources of Group Differences

Although the balancing procedure used all variables available for the entire student group and introduced the desired statistical control for those variables used in the balancing, it was not expected that this would eliminate all group differences related to other relevant variables (differences in input and/or exposure to relevant processes other than UB). Some insight into the extent to which the two groups still differed on relevant pre-process and extra-process variables was possible, using data which was available for only a subset of students (i.e., those responding to the Basic Student Questionnaire). These examinations were made after balancing had been performed, and the results thus reflected any additional differences between the UB and CS groups after correction for sex, race, poverty status, academic risk status, and grade level (i.e., residual differences). Variables examined included place of residence, highest educational attainments of parents, parents' occupations, previous high school course of study, participation in other educational intervention programs, and specific services received from other intervention programs.

There were very few statistically significant differences between the UB and CS group in these residual difference comparisons. Those significant differences uncovered were, in general, quite minor and the net effect of these input differences would be expected to result in a small bias favoring the CS group. There are, undoubtedly, other extra-process variables on which these two groups differ. Since there were no measures of these variables, the nature of such differences and their possible influence on analysis results is a matter of speculation. In general, however, the two groups appeared quite comparable after balancing.

DIFFERENCES IN EDUCATIONAL CONTINUANCE BETWEEN UB AND CS GROUPS

Two of the major objectives of the UB program involve educational continuance: (1) continuance in and completion of HS, and (2) PSE entry. The extent to which the program meets these objectives nationally is the subject of this section.

High School Continuance

Table 1 presents full year HS continuance rates (completion rates for twelfth graders) for the UB and CS groups by grade level. In addition to presenting the total grade level rate for the UB group, Table 1 provides continuance rates within grade level by length of UB program participation. There were some cases for which continuance could not be determined due to missing data. Three continuance rates were therefore computed and reported. These three rates are: (1) maximum rate (P_{max}), computed by assuming that all indeterminate responses would have indicated continuance; (2) minimum rate (P_{min}), computed by assuming that all indeterminate responses would have indicated noncontinuance; and (3) an adjusted rate (P_{adj}), computed by adjusting for "item" nonresponse.[4/] The values of P_{adj} are the best available single estimate of the continuance rates, while P_{max} and P_{min} define the upper and lower limits, respectively, of this rate for these groups of respondents.

4/ Differential adjustment for nonresponse due to nonselection during the fall 1974 subsampling was employed.

Table 1

FALL 73 TO FALL 74 HIGH SCHOOL CONTINUANCE/COMPLETION RATES BY GRADE FOR UPWARD BOUND PARTICIPANTS AND COMPARISON GROUP

Grade		Student Group: UB in Program at Grade 10	UB Joining Program in Grade 11	UB Joining Program in Grade 12	UB Total Group	CS	Standard Error[a]
12	P_{max}[b]	88.8%	89.4%	89.4%	89.3%	91.1%	2.2%
	P_{min}[c]	86.2%	87.4%	85.4%	86.4%	81.6%	3.1
	N[d]	216	411	436	1063	549	—
	P_{adj}[e]	88.5%	89.0%	88.9%	88.8%	90.1%	2.5
	N[f]	214	405	421	1040	496	—
11	P_{max}[b]	91.1%	91.7%		91.6%	92.4%	2.2
	P_{min}[c]	83.5%	85.8%		85.3%	80.3%	2.5
	N[d]	228	738		966	557	—
	P_{adj}[e]	90.7%	91.4%		91.3%	91.3%	2.3
	N[f]	210	691		901	472	—
10	P_{max}[b]	93.5%			93.5%	86.6%	3.5
	P_{min}[c]	89.5%			89.5%	79.1%	4.1
	N[d]	413			413	571	—
	P_{adj}[e]	93.4%			93.4%	85.5%	3.7
	N[f]	392			392	522	—

NOTE: Values reported are based on weighted data, using balanced CS weights, corrected for fall 1974 subsampling and adjusted for cases with indeterminate classification as to grade level or length of time in UB.

a/ Standard errors presented are computed for the difference in rates for the total group of UB participants within a particular grade level.

b/ Computed by assuming all indeterminate continuation cases as continuing or completed.

c/ Computed by assuming all indeterminate continuation cases as not continuing or completing.

d/ Unweighted cell size in computing P_{max} and P_{min}.

e/ Computed by adjusting weights for indeterminate continuation/completion cases.

f/ Unweighted cell size in computing P_{adj}.

Nine distinct subgroups are defined by the data presented in Table 1. Maintaining comparisons within grade level, only six independent comparisons of continuance rates among these nine groups are possible. The a priori comparisons decided upon were:

1) All UB twelfth graders compared with CS twelfth graders.
2) All UB eleventh graders compared with CS eleventh graders.
3) UB tenth graders compared with CS tenth graders.
4) UB twelfth graders who joined the program in grade 11 or earlier compared with UB twelfth graders joining the program in grade 12.
5) UB twelfth graders who joined the program in grade 10 or earlier compared with UB twelfth graders joining the program in grade 11.
6) UB eleventh graders who joined the program in grade 10 or earlier compared with UB eleventh graders joining the program in grade 11.

The first three comparisons listed examine differences between the total UB and the CS group within a particular grade, while the remaining comparisons examine differences within the UB group and a particular grade level as a function of length of participation.

Standard errors reported in Table 1 are related to the differences in rates for the total UB and CS groups within grade level (the first three comparisons listed above). As can be seen, significantly higher rates exist for the UB group in the tenth grade on all three estimates (P_{max}, P_{min}, and P_{adj}). UB and CS continuance rate differences for eleventh and twelfth graders are mixed (reflecting, in part, the rather large fluctuation of P_{max} and P_{min} in the CS group), but none of the differences approach statistical significance.

The three remaining comparisons (for each of the three rates) were made within the UB group to discover a possible relationship between length of program participation and HS educational continuance. No such relationships were found. The maximum absolute difference observed was 2.3 percent and the minimum standard error computed was 2.6 percent.

PSE Entry

Differences in PSE entry rates may be considered more or less independent of differences in HS continuance by appropriately defining a subpopulation of students eligible for PSE entry. One such subpopulation of

students is made up of HS graduates. Another population of eligibles may be defined in light of the current trends toward "open door" postsecondary institutions for which HS graduation is not a necessary requisite for admission. The second population is thus defined as all students not in HS; the former group (HS graduates) is a proper subset of the latter. PSE entry rates were determined for both such subgroups.

PSE entry rates for the total subgroups of UB and CS eligibles are given in Table 2. Due to a relative large percentage of indeterminate response, the only rates given are those in which weight adjustments for indeterminate response were made (analogous to the P_{adj} values for HS continuance). For the HS graduate subgroup, the rates are further partitioned by length of participation in the UB program. Differences between UB and CS groups in PSE entry rates are conspicuously large. Not only is the entry rate significantly greater for the UB group in a statistical sense, it is also of considerable practical significance due to the absolute magnitude of the difference. Among HS graduates, less than half of the CS group enter PSE as compared to almost three-fourths of the UB participants. In the "all eligible" group (including HS dropouts), it is estimated that 13 of 20 UB students enter PSE, as compared to 8 of 20 in the balanced CS group.

Within the UB HS graduate group, two additional independent a priori comparisons were made. HS graduates who had joined UB in or prior to the eleventh grade continued into PSE at a 4 percent higher rate than those joining in the twelfth grade, but when compared to a standard error of 4.1 percent this difference was not statistically significant. Graduates who had joined UB prior to the tenth grade entered PSE at an 8.9 percent higher rate than those joining in the eleventh grade, which represents a statistically significant difference with an associated standard error of 3.6.

UB participation, therefore, seems highly related to PSE entry, in both a qualitative and quantitative sense. Program participation, regardless of length of such participation, is strongly related to increased PSE entry; and, among those who complete HS, PSE rate is a monotonic nondecreasing function of length of participation in the program.

It should be pointed out that the PSE entry rates reported in Table 2 reflect immediate PSE entry (i.e., entry into PSE within a year of gradu-

Table 2

POSTSECONDARY ENROLLMENT RATES FOR UPWARD BOUND PARTICIPANTS AND COMPARISON STUDENTS

Population Considered		Group					Standard Error[a]
		UB In Program In Grade 10	UB Joining Program In Grade 11	UB Joining Program In Grade 12	UB Total Group	CS	
High School Graduates[b]	Rate	78.1%	69.2%	68.2%	70.7%	46.7%	5.3%
	N[c]	191	366	343	900	413	
All Eligibles[d]	Rate				65.1%	42.5%	4.6%
	N[e]				1135	618	

NOTE: Reported percentages are based on weighted data, using weights balanced within grade level, corrected for fall 1974 subsampling, and adjusted for cases with indeterminate classification as to grade level or length of time in UB.

a/ Standard errors presented are computed for the difference in rates for the total group of UB participants within a particular grade level.

b/ Reported rate represents PSE entry during, or prior to, fall 1974 for students classified as high school graduates in fall 1974.

c/ Unweighted cell sizes.

d/ Reported rate represents PSE entry during, or prior to, fall 1974 for all members of the sample classified as not in high school in fall 1974. For these computations, weights were also balanced over grade level. Cases with indeterminate PSE entry status (less than 0.1% and 0.3%, respectively, of the UB and CS weighted totals) were assumed not to have entered PSE.

ation or dropout). Differences in the "lag entry" rates among the CS and UB groups (i.e., entry into PSE over a longer time span) could reduce the original advantage of the UB participants or increase it. The data of this study do not, however, allow examination of hypotheses regarding "lag entry." Furthermore, data are not available from the current study to assess the PSE persistence within the two groups. That is, it is possible that the UB participants entering PSE do not remain there at as high a rate as the CS PSE entrants. Were this the case, PSE completion for the two groups could be equivalent or even greater for the CS group.

Types of PSE Entered

Given the greater rate of PSE entry among UB participants, the question of what types of PSE institutions which were entered logically follows. Table 3 indicates the type of PSE institutions in which UB and CS group members actually enrolled. The percentages reported in Table 3 are based on the subset of UB and CS group members who indicated that they had attended some form of PSE during or prior to fall 1974. A substantially and significantly greater proportion of the UB subgroup had enrolled in four-year colleges or universities, while a significantly smaller proportion of the UB subgroup had enrolled in two-year colleges and certain types of other training schools (i.e., vocational, trade, business, etc.).

Longitudinal Educational Continuance

It is possible, by use of the Markov model for educational continuance introduced in the second paper in this series, to examine long term educational continuance for the UB and CS groups. This use of synthetic cohorts allows computation of HS graduation rate, given tenth grade entry, for various UB entry patterns. These values were computed[5/] and are presented in Table 4.

The information presented in Table 4 mirrors the findings previously reported. Probability of twelfth grade completion given tenth grade entry is not significantly related to UB participation, regardless of the extent of that participation. On the other hand, probability of PSE entry given tenth grade entry is significantly related to UB participation, and the extent of UB participation seems linearly related to an increase in this probability.

5/ Using adjusted, rather than minimum or maximum, rates.

Table 3

TYPES OF POSTSECONDARY EDUCATION INSTITUTIONS ENTERED BY UPWARD BOUND PARTICIPANTS AND COMPARISON STUDENTS

Type of PSE Institution	Percentage Attending[a]		Standard Error of Difference
	UB	CS	
Vocational, trade, business, or other career training school not requiring a high school diploma[b]	3.3%	8.0%	2.8%
Vocational, trade, business, or other career training school requiring a high school diploma[b]	4.8%	16.3%	3.9%
Junior college or community college (two year)	17.2%	31.3%	5.8%
Four year college or university	75.7%	45.1%	5.2%
Number of Cases (unweighted)	832	252	

NOTE: Reported values were computed using weighted data, after balancing and correcting for fall 1974 subsampling on the subset of students classified as attending or having attended some PSE institution in fall 1974.

a/ For purposes of these computations, indeterminate responses (accounting for eight cases in the UB group and one case in the CS group—1.0% and 0.6% of the unweighted within group totals, respectively) were considered as not having entered. As a result of this data treatment and the fact that an individual may have attended more than one of the specified types of PSE institutions (or some other type of institution), percentages are not constrained to add to 100% over PSE type.

b/ Percent attending vocational/technical schools is closely approximated by adding percents for the two subclassifications presented, since overlap (attendance at both types of institutions) occurred only once in the UB group and once in the CS group.

Table 4

PROBABILITIES OF HIGH SCHOOL COMPLETION AND PSE ENTRY, GIVEN TENTH GRADE ENTRY, AS A FUNCTION OF DEGREE OF EXPOSURE TO UPWARD BOUND

	Exposure to UB			
	3 or More Years (Entered UB in Grade 10 or Earlier)	2 Years (Entered UB in Grade 11)	1 Year (Entered UB in Grade 12)	No Exposure (CS)
High School Graduation:				
Probability	.750	.696	.694	.703
Difference[a/]	+.047	-.007	-.009	--
Standard Error of Difference	.060	.042	.049	--
PSE Entry:				
Probability[b/]	.602	.527	.472	.316
Difference[a/]	+.286	+.211	+.156	--
Standard Error of Difference	.052	.051	.049	--

NOTE: Probability values reported are computed by multiplying year to year continuance/completion rates, adjusted for indeterminate classification variables and continuance/completion index. The results reflect balancing of the CS group.

a/ Difference is CS group probability value subtracted from UB group probability value. Positive differences, therefore, are favorable to the UB group.

b/ For twelfth graders, the probability of transition from twelfth grade to college is computed and multiplied by lower grade continuance rates. Probability values reported can not, therefore, be exactly reconstructed from previously presented results.

DIFFERENCES BETWEEN UB AND CS GROUPS ON FACTORS RELATED TO SUCCESS IN PSE

The third major objective of the UB program is to provide UB students with the skills and motivation necessary for success in PSE. The extent to which the program is meeting this objective could not be directly evaluated due to difficulty in defining and/or measuring such variables. Success in meeting the objective may, however, be examined indirectly by examining differences between the UB and CS groups on factors related to success in PSE. With the exception of HS academic measures, which were theoretically available for all sampled students, these examinations were based on data from only a subset (approximately 80 percent) of the students, namely those participating in the spring 1974 group administrations of the Basic Student Questionnaire (analyses not reported here indicated that this group was a biased subsample). Further, some reported results are based on responses to a set of items that were included in a nested skip pattern. In such a pattern, the nature of the response to one of the items determines whether or not an individual will answer subsequent items. The number of individuals responding to a given item will typically decrease for items that are more deeply nested in the skip pattern. Thus, the number of respondents on which some results are based was even further reduced.

Academic Factors

High school academic measures are generally predictive of success in PSE. Specifically examined were three high school academic change measures: (1) change in academic grade point average from ninth grade to current grade; (2) change in proportion of academic credits passed from ninth grade to current grade; and (3) change from ninth grade to current grade in proportion of credits taken that could be classified as academic. The first and second variables listed above are indices of changes in high school academic achievement. It seems reasonable that a program attempting to recruit high risk students and to provide them with skills necessary for success in PSE would attempt to improve such achievement. The third variable is an index of course load concentration. In preparation for entry to two- and four-year colleges (emphasized by the UB program) it would seem reasonable to stress a greater concentration of courses in the academic area.

There was no support from the data for a relationship between UB participation and change in these academic related factors. In fact, for some comparisons, the results were not even in the predicted direction. These analyses were, however, attenuated due to very large proportions of indeterminate data.

Aspirations and Expectations

Of the many motivational aspects related to PSE success, two of the most obvious are aspirations and expectations. Part of the UB program function is to raise participants' aspirations to attend college and to provide them with reasonable expectations that these aspirations will be met. Differences between the UB and CS groups were examined in terms of stated plans for entry into PSE, desired and expected level of educational attainment, and desired and expected occupations.

Results of analyses of these variables consistently favored the UB participants. For each of grades 10 through 12, UB participants planned PSE entry at significantly higher rates than their CS counterparts. (As shown previously, these plans are, in fact, realized for a large proportion of the UB group). Differences between the groups in both desired and expected educational attainment were statistically significant, with UB participants both aspiring to and expecting higher levels of education. Further, the UB participants desired and expected to be in occupations requiring greater amounts of education beyond HS at significantly greater rates than comparison students.

Actions Taken in Preparation for PSE

The counseling component of many UB projects includes direction in preparation for PSE. If such counseling is effective, it would be expected that UB participants would take more preparatory actions than members of the CS group.

For both eleventh and twelfth graders planning PSE entry within four years, UB participants had, on the average, taken significantly greater numbers of preparatory actions (such as visits to a campus, taking admission tests, and making formal and informal inquiries concerning various

aspects of PSE entry) than had members of the CS group. Further, UB participants in the twelfth grade who reported planned entry into PSE had made application to a significantly greater number of PSE institutions than had their CS cohorts. Among those who had applied, application to four-year colleges was much more prevalent and application to vocational/technical schools more infrequent in the UB group. While acceptance rate for the UB applicants was higher than that for the CS applicants it was not significantly so.

Availability and Adequacy of Financial Aid for PSE

Obtaining adequate financial aid is clearly a necessary condition for poverty level students to attempt (much less succeed in) PSE. The UB program is geared for assisting participants in applying for and attaining adequate financial aid packages. If this function of UB is being successfully affected, then UB participants who have applied to PSE institutions should apply for financial aid in greater proportions than the analogous CS group members. Moreover, of those applying for aid, UB participants would be expected to obtain adequate aid in greater relative numbers.

Among those twelfth grade students applying to PSE, a much greater percentage of UB participants had applied for financial aid (slightly over half of the CS subgroup but almost 90 percent of the UB subgroup had applied for aid). Of those who reported applying for financial aid, the proportion of UB aid applicants who reported actual offer of aid was not significantly greater than the comparable proportion of CS aid applicants; however, among those reporting offers of aid, significantly smaller percentages of UB participants reported offer of inadequate aid than did nonparticipants, and the UB participants reported an average offer of over $500.00 per year more aid (primarily due to larger grants).

DIFFERENTIAL PROJECT EFFECTIVENESS

Given that the UB program appears successful at a national level, a logical second step in analysis involves examinations of program variation, and specifically, whether such variation, as reflected in differences in

structural or functional characteristics of projects and inputs to projects, is associated with differential student outcomes. There is every reason to expect that projects differ in terms of their effectiveness as measured by student outcomes; only the extent and the correlates of this variation are in question. It is also quite logical to assume that there are reasons why some projects are more effective than others. It should be pointed out, however, that the variability in effectiveness is relative variation. The absolute magnitude of the variation or deviations of UB projects from some absolute base was not the major focus of these analyses. Rather, attempts were made to identify the sources of whatever variation did exist.

The analyses used to address these questions were conducted in the spirit of relational analysis and should be considered exploratory for two major reasons. First, the program characteristic or function variables are based upon questionnaire data that is subject to reporting error and biases, and second, not enough is known about the UB program to test well-defined models of the UB process.

Given the nature of UB, program-related processes operate on UB students at the project level. Hence, the chosen unit of analysis providing the most meaningful and interpretable analytic base was the project. In order to organize the data base for a project-oriented analysis, several preliminary procedures were necessary. In general, the approach was to produce a single measure at the individual project level for each attribute of input, process, and output considered. This was accomplished by project level aggregation of student data and staff data (in the latter case, aggregation within and across staff category was possible). The resulting manipulations produced a data base of 54 observations on a set of variables covering student preprocess measures (project input), project structure and function (project process), and student outcome measures (project output).

Several criteria were used to determine the variables to be used in these analyses. Measures within the three major variable domains (input, process, and output) were selected on the basis of face validity, variability, stability, and extent of indeterminate data. Measures were sought that reflected theoretically important attributes of the UB process (e.g.,

kind of instruction) or that were obvious candidates for outcome indices or for control of differences in initial selection of UB students (e.g., ninth grade GPA). Additionally, the measures were examined for within-project and between-project variability. Measures having little within project variability and high between project variability were preferred. Finally, the rate of indeterminate data was considered, and if this rate was high for a given data element, then the variable was not included.

Several approaches were taken in examining relationships between the three sets of variables using multiple discriminant analysis and multiple regression analysis. All approaches maintained the same basic thrust: relating project process measures to outcome measures, while controlling for differences in input. The discriminant analyses followed two distinct but similar paths in attempts to establish relationships among the classes of variables. In the first approach, projects were grouped according to process measures and these groups were examined for differences in the set of student outcome measures. In the second approach, projects were clustered in terms of student outcome measures and resultant groups were examined for differences in process measures. Stepwise techniques were used in all discriminant function solutions. Regression analyses considered the outcome measures individually and examined the relationsips between each measured output and subsets of the process variables. Stepwise approaches as well as the testing of a priori rational models were used in the regression analyses. Control for the set of input measures was obtained in all analyses by forcing input variables into the various solutions.

In all of the analyses conducted, the set of input variables showed a strong relationship to the output measures. Project level student preselection factors, such as proportion of academic risk students, proportion of poverty level students, proportion of twelfth graders, ninth grade academic GPA, and academic course load, were related to project level output measures (e.g., average change in academic GPA, HS continuance rate, PSE entry rate) in intuitively reasonable directions. Moreover, these variables were consistently major predictors of project outcomes in all analyses. The project process measures, however, did not enter into

the solutions in any consistent pattern or with any consistent degree of predictive power. In light of the extreme open-endedness of the stepwise procedures used, the lack of a consistent pattern and absence of consistent predictiveness among the process variables suggests that the entry of the process variables into the solutions may be an artifactual capitalization on sampling fluctuations in the covariance matrices.

The one small hint of a relationship between process and output, after adjustments for input differences, comes from the frequent occurrance of project size and emphasis of various academic year program functions in the several regression and discriminant models, and the notable absence in such models of measures of emphasis of summer program functions. Project size may partially reflect activity level of the academic year program, since the measure represents the number of students enrolled in the project in the fall of 1973. This pattern of findings is suggestive of a possible positive relationship between level of academic year program activity and student outcomes. There are, of course, other plausible explanations of this pattern.

DISCUSSION

The results of the national impact evaluation are quite consistent in support of the central theme that <u>for outcomes concerning PSE the UB group differs substantially from the CS group, but for outcomes concerning HS academic success or completion the groups do not differ</u>. With few exceptions, this theme is pervasive, even for results that may be attenuated due to excessive or differential proportions of indeterminate data.

UB participants show greater motivation for PSE entry and for occupations requiring higher levels of education. They take more preliminary actions in preparation for PSE. They apply to and enter PSE institutions with greater relative frequency. They apply for financial aid in greater relative numbers and the aid packages which they are offered are more adequate. Although the PSE entry rate is greater for UB participants, this may be due more to the higher application rate, since acceptance rates among those who apply is no greater for the UB group. Further, although

the aid packages offered to UB participants are seen as more adequate, there is a lack of statistical evidence that UB participants who apply for financial aid are offered aid at any higher rate than non-participant aid applicants.

The types of PSE institution to which UB participants apply, and enter, in greater numbers are four-year institutions. Application to and entry into this type of institution is almost double the rate of the CS group. Given the typically greater selectivity and cost of this type of institution, the higher PSE entry rates are more impressive but the larger financial aid packages are less impressive.

These results cannot be attributed to differences between the UB and CS groups on school-specific factors, academic risk status, poverty status, race, or sex, since these factors were controlled either in the study design or statistically through the balancing procedures. Other observed differences between the UB and CS groups for which statistical adjustment were not possible, could not explain differences in PSE entry rate of the direction, consistency, and magnitude of those reported in Table 3, since the observed pre-process and extra-process differences were typically quite small and in a direction which should have favored the CS group over the UB group.

Possible bias due to nonresponse to fall 1974 data collection was examined, and given the small extent of this possible bias it is extremely unlikely that it could account for the substantial differences in PSE entry rate, even in the event that the bias was operating differentially for the UB and CS groups. There is always the possibility in survey studies, however, that overlooked or unmeasured (and therefore uncontrolled) variables have confounded the results.

Since results are based primarily on unverified student reports, another possible explanation of the findings would be response bias on the part of students. To advance this as a tenable hypothesis for group differences, one would have to argue for <u>differential</u> response bias in the two groups. Given the loyalty of UB participants to their program, such arguments do have some intuitive appeal. Some student reports were, however, subjected to validation, and no differential response validity between the UB and CS

groups was observed. In light of these findings, explanations based on differential response bias are more tenuous.

There are two remaining plausable explanations for the finding of higher PSE entry rate for UB participants. The first, and perhaps most obvious explanation, is that participation in the UB program raises the probability of PSE entry. The second explanation is that some unmeasured variable, which is highly related to PSE entry, is a major factor in selection of students into the program. One such variable may be high motivation for educational continuance beyond high school. It was observed that UB participants plan and expect to attend PSE in greater proportions and for longer periods than the CS group. This greater motivation for education continuance after high school should be directly related to the higher incidence of PSE entry in the UB group. The question remains, however, as to whether this motivation was affected by the UB program. There is simply not enough available information from this study to determine whether the UB program was instrumental in raising participants' motivation to attend PSE or whether selection into the program is based to some extent on already extant motivation.

The data do support an hypothesis that the UB program is facilitating actions taken in preparation for PSE entry, including application. Differences between the two groups in motivation to attend PSE were reduced to some extent by restricting the analyses to the subset of students planning PSE entry. Because of this restriction, quantitative motivational differences cannot provide a plausable alternative explanation of this finding, although qualitative differences in degree of desire to attend PSE may still exist. While preparatory actions and application rates are higher in the UB group, actual acceptance into PSE among those students who apply is not significantly greater for UB participants. The major function of the UB program in this area, therefore, appears to be that of aid in the initiation of actions leading to admission rather than aid in gaining admission once application has been made. It should be noted, however, that the UB program is working with large proportions of "high risk" students. The higher application rate among UB participants would, therefore, likely include among the group of UB applicants greater proportions of these high

risk students than among the CS applicants. If this is the case, then even a similar acceptance rate for UB participants would suggest that the UB program is facilitating PSE admission among those who apply.

These results are quite compatible with what one would expect from a UB project situated at a four-year college, emphasizing the importance of PSE entry, providing paid visits to other colleges, providing counseling and other assistance in applying for admission and financial aid, and having solid contacts with admission and financial aid officers at several PSE institutions, including the host institution.

The results of the analyses of project variation resist a simple interpretation, but a general theme is reflected throughout: project level outcome show relatively consistent and strong relationships to the measured input characteristics of the students in the project; however, they show, at best, weak relationships with project process measures when adjustments for input measure differences are made.

The relationships between student outcomes and preprocess characteristics of the students are fairly intuitive and offer little useful information to UB program planners. The fact that a greater proportion of students are placed in four-year educational institutions by projects with proportionately fewer academic risk students is certainly not a surprising finding. Any project can influence the preprocess characteristics of its participants through its selection criteria (for which some lattitude exists).

The lack of systematic and consistent relationships between process and outcome measures is more difficult to explain. It may be that no relationship between process and outcome measures exist, although such an interpretation is illogical. On the other hand, the lack of observed relationship could be attributed to many other causes: measurement error, inappropriate choice of variables, or inappropriate analysis models, to name but a few. One of the most reasonable explanations is that measurement error and relatively pervasive relationships between input and output jointly mask any existing relationships between process and output. If this is the case, then either the relationships are relatively weak, the measurement error is large, or both.